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PATENT SPECIFICATION 1,037,298

DRAWINGS ATTACHED.

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COMPLETE SPECIFICATION

Railway Vehicle Suspension Means.

We, SIMMERING-GRAZ-PAUKER AKTIENGESELLSCHAFT FUR MASCHINEN-, KESSEL- UND WAGGONBAU, an Austrian Company of Mariahilfer Strasse 32, Wien VII, Austria, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

The invention relates to railway vehicle suspension means.

According to the invention, there is provided railway vehicle suspension means comprising a hollow first resilient means adapted to support resiliently a vehicle frame from an axle support member, and flexible guide means housed in a dust-tight manner within the resilient means, said guide means including two guide members adapted to be attached respectively to the vehicle frame and the axle support member, said guide members being capable of vertical relative sliding movement and one of said guide members including second resilient means which are arranged to absorb only horizontal loads on the axle support member while permitting relative angular movement of the axle support member and the vehicle frame.

Hitherto vehicle suspensions have been enclosed in an oil bath and have been manufactured of steel, the supports being protected from the entry of dust and dirt by means of special seals. Suspensions of this kind are, however, rigid in both the longitudinal and the transverse directions of the vehicle. Other axle bearing guides for railway vehicles have been proposed in which there is used a rubber cushion in the form of a hollow cylinder, said rubber cushion being vulcanise-bonded both to an inner and to an outer bush, and the bushes being attached respectively to the axle support and the vehicle frame. This arrangement fails to provide sufficient freedom of movement vertically for effective springing in the vertical direction.

The suspension means of the present invention is sprung in the vertical direction by means of the first resilient means independently of the horizontal springing provided by the second resilient means.

Preferably the guide members include respective cylindrical sleeves slidable one within the other and said resilient means comprise a hollow cylindrical resilient member on which one of said sleeves is supported.

The said second resilient means are preferably such that the resilient strength thereof in respect of horizontal loads in a first direction which, in use of the suspension means on a vehicle, is perpendicular to the vehicle axle is greater than the resilient strength in respect of horizontal loads in a second direction substantially perpendicular to said first direction.

The said first resilient means preferably comprise a plurality of rings of rubber or synthetic resin material arranged coaxially with their axes vertical, each said ring having an annular bearing plate secured to each axially facing surface of the ring.

The invention will be described, by way of example only, with reference to the accompanying drawings, in which:—

Figure 1 is a sectional view taken in a plane perpendicular to a vehicle axle of suspension means according to the invention, and

Figure 2 is a cross section through a part of the suspension means shown in Figure 1.

Referring to the drawings, Figure 1 shows one half of an axle box casing 1 of a railway vehicle having secured to each

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side thereof axle support members 2 (one only of which is shown in Figure 1).

It will be understood that the other axle support member 2 which is not shown is provided with suspension means which is identical in all respects to that shown in Figure 1. The axle support member 2 has a support surface 3 which is disposed in the same place as the axis of the axle box casing 1. A horizontal plate 4 is secured to the surface 3 by means of bolts 5. A fixed sleeve member 6 is welded to the plate 4 and is disposed with its axis vertical. The sleeve member 6 has an inner surface lining 7 of synthetic resin material which has a low-friction inner surface 8.

The horizontal plate 4 also supports a first resilient means which comprises three resilient rings 9,10,11 of rubber or synthetic resin material arranged coaxially about sleeve member 6, to form a hollow substantially cylindrical resilient member. Each of the resilient rings 9,10,11 is identical, having, as shown, a cross section such that the radial width of each ring is least at substantially the mid-axial plane of the ring. The axially facing surfaces of each of the rings 9,10,11 are provided with annular metal bearing rings 12,13,14 respectively which are secured to the respective resilient rings by an adhesive or, in the case of rubber resilient rings, by vulcanisation. The lowermost plate 12 of the resilient ring 9 is in direct contact with the plate 4, and the uppermost plate 14 of the resilient ring 11 bears against the underside of a frame member 15, which constitutes part of the bogie or chassis of the railway vehicle.

The cross sectional shape of each of the resilient rings 9,10,11 ensures that, when the rings are under vertical compressive strain, they do not extend radially outwardly or inwardly of the bearing plates 12,13,14. When horizontal shear stress is applied to the resilient rings 9,10,11, the bearing plates 12,13 which are disposed between the resilient ring 10 and the resilient rings 9 and 11, contact the outer surface of the sleeve member 6, thereby preventing excessive horizontal shearing of the resilient rings 9,10,11, so that the latter are subjected predominantly to the forces arising from vertical relative movement between the axle support member 2 and the frame member 15. The said outer surface of the sleeve member 6 is frusto-conical in shape and tapers upwardly, the maximum outer diameter of the sleeve member 6 being substantially equal to the inner diameter of the annular plates 12.

The suspension means includes a second resilient means comprising a hollow cylindrical resilient member 16 of rubber or synthetic resin material which is disposed within, and coaxially with, the substantially cylindrical resilient member constituted by the resilient rings 9,10,11. The resilient member 16 is a press or prestressed fit between an outer metal cylindrical sleeve 17 and an inner cylindrical metal sleeve 18, the resilient member 16 being restrained against axial movement by clamping rings 19,20,21,22. At its lower end the inner sleeve 18 has an internal flange 23 which serves as a seat for a hub ring 24 which is welded to the inner sleeve 18.

A downwardly extending support 26 is fixed to the frame member 15 and extends axially into the space enclosed by the resilient member 16. The hub member 24 is secured to the support 26 by means of a bolt 27, which bears against the hub ring 24 through a shim or washer 28, so that the inner sleeve 18 is forced axially against an annular downwardly facing shoulder 29 on the support 26. The hub ring 24, and therefore the inner sleeve 18, is secured against rotation about its axis by means of an eccentrically located locking pin 30 which locates the hub ring 24 on the support 26.

The outer surface of the cylindrical sleeve 17 is received without clearance in the lining 7 of the sleeve member 6, the said low-friction inner surface 8 of the lining 7 ensuring relatively easy axial sliding movement of the cylindrical sleeve 17.

The cylindrical resilient member 16 is subjected to forces arising from horizontal relative movement between the axle support member 2 and the frame member 15, such forces being transmitted through the sleeve member 6 and the support 26 respectively. Vertical movement of the resilient member 16 is unrestricted and is therefore determined solely by the resilient rings 9,10,11.

The hollow cylindrical resilient member 16 is arranged so that its resilient strength in a direction substantially perpendicular to the vehicle axle is greater than its resilient strength in a direction parallel to the axle of the vehicle. Referring to Figure 2, this is achieved by providing stiffening inserts 31 in those portions of the member 16 which face in, or approximately in, a direction perpendicular to the axle of the vehicle, (i.e. the direction of movement of the vehicle) and by providing recesses 32 in those portions of the member 16 which face in, or approximately in, the direction of the axle of the vehicle. The stiffening inserts 31 may be of fabric or steel. By this arrangement, it will be appreciated that the vehicle will have a suspension which has greater stiffness in respect of longitudinal rocking of the vehicle than in respect of transverse rocking of the vehicle.

WHAT WE CLAIM IS:—

1. Railway vehicle suspension means comprising a hollow first resilient means adapted to support resiliently a vehicle frame from an axle support member and flexible guide means housed in a dust-tight manner within the resilient means, said guide means including two guide members adapted to be attached respectively to the vehicle frame and the axle support member, said guide members being capable of vertical relative sliding movement and one of said guide members including second resilient means which are arranged to absorb only horizontal loads on the axle support member while permitting relative angular movement of the axle support member and the vehicle frame.

2. Suspension means as claimed in claim 1 wherein said guide members include respective cylindrical sleeves slidable one within the other and said second resilient means comprise a hollow cylindrical resilient member on which one of said sleeves is supported.

3. Suspension means as claimed in claim 2 wherein the hollow cylindrical resilient member is in a prestressed condition and is locked against movement or deformation along its axis by means of clamping rings located at each axial end of the member.

4. Suspension means as claimed in claim 2 or claim 3 wherein the internal surface of the outer cylindrical sleeve is provided with a synthetic resin surface to facilitate sliding of the sleeves relative to each other.

5. Suspension means as claimed in any preceding claim wherein the said second resilient means are such that the resilient strength thereof in respect of horizontal loads in a first direction which, in use of the suspension means on a vehicle, is perpendicular to the vehicle axle is greater than the resilient strength in respect of horizontal loads in a second direction substantially perpendicular to said first direction.

6. Suspension means as claimed in claim 5 wherein the second resilient means is formed of rubber or synthetic resin material and is provided with reinforcing inserts of a metal or textile material in those portions thereof which face in, or approximately in, said first direction, said second resilient means being further provided with recesses in those portions thereof which face in, or approximately in, said second direction.

7. Suspension means as claimed in claim 2, 3 or 4 wherein the inner cylindrical sleeve is adapted to be supported from the vehicle frame by a vertically extending support which extends for about half the total height of the first resilient means, the second resilient means being attached to the lower end of said support, and supporting the inner sleeve.

8. Suspension means as claimed in any preceding claim wherein the said first resilient means comprise a plurality of rings of rubber or synthetic resin material arranged coaxially with their axes vertical, each said ring having an annular bearing plate secured to each axially facing surface of the ring.

9. Vehicle suspension means substantially as herein described with reference to the accompanying drawings.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

Fig.2

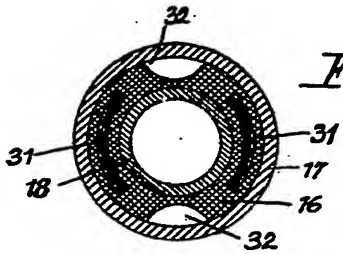

Fig.1